IQ and the Weight of Nations

Salahodjaev, Raufhon and Azam, Sardor

7 August 2015

IQ and the Weight of Nations

Raufhon SALAHODJAEV

Institute of Forecasting and Macroeconomic Research, Uzbekistan

Westminster International University in Tashkent

[1]Sardor AZAM

Institute of Forecasting and Macroeconomic Research, Uzbekistan

Westminster International University in Tashkent

Please cite as: Salahodjaev, R., & Azam, S. (2015). IQ and the weight of nations. *Personality and Individual Differences*, *87*, 105-109.

SUMMARY

The antecedents of the 'weights of nations' have been in the center of theoretical and empirical discussion over the past decades. In this research, we contribute to extant studies by investigating the effect of general intelligence, measured by nation IQ, on the Body Mass Indices (BMI) of male and female populations for 187 countries of the world. Our results suggest an inverted U-shaped link between intelligence and BMI. Even after controlling for an alternative set of control variables such as trade openness, urbanization and others, our results remain intact. This paper documents a turning point of 80.8 for female and 83.7 IQ score for male BMI. The results remain robust to a number of robustness checks.

JEL: I15, O15

Keywords: IQ, health, obesity, BMI, globalization, trade openness

[1] Corresponding author's email: sardorazam2@yandex.ru

1. Introduction

Policymakers and academia regard obesity as a major contributor to the global burden of disease (e.g. Philipson, 2001). Therefore, understanding the determinants of obesity is subject to increasing research in empirical literature (Baum, 2009). While ample studies link globalization, socio-economic development, and sedentary lifestyles to obesity (e.g. French et al., 2010; De Vogli et al., 2013; Au and Johnston, 2014), no research has investigated the association between cognitive development and cross-national differences in BMI. That is the objective of this study. Further, related studies successfully link intelligence to economic development, quality of institutions and numerous health outcomes (e.g. Lynn & Vanhanen, 2012a; Meisenberg, 2012; Salahodjaev, 2015). If nation IQ is a powerful predictor of the quality of life, we might anticipate a negative effect of intelligence on obesity.

First, intelligence is a substitute for social capital (Hoogheet al., 2010). Individuals in high IQ societies are more cooperative (Jones, 2011) and tend to have higher levels of interpersonal trust (Sturgis et al., 2010). It is obvious that social networks are a source of the dissemination of health-promoting knowledge and the approval of health behaviors. Further, intelligence increases the availability of social support (Salovey et al., 2000) "which facilitate[s] the maintenance of healthy norms and the self-regulation of beneficial behaviors" (Yoon and Brown, 2011, p. 298). As there is a well-established link between various proxies of social capital, intelligence and health (Kanazawa, 2014; Subramanian et al., 2002; Gomez et al., 2005), we expect a negative link between IQ and obesity.

In addition, intelligence is not only a proxy for social capital: it is an alternative measure of education stock across the nations (Meisenberg and Lynn, 2011). Intelligent individuals are "much better informed about characteristics of food, including calories, as a result of food labels, diet advertising and publicity about obesity" (Philipson and Posner, 2008, p. 979). While there is abundant empirical evidence on the positive link between human capital and health, in a metaanalysis of 298 studies Cohen et al. (2013) comes to a conclusion that the effect of education on obesity is at best mixed.

On the other hand, obesity is also caused by **detrimental behavioral tendencies** (French et al., 2010) that have also been linked to intelligence. For example, intelligence is positively correlated with consumption of alcohol, tobacco and drugs (e.g. Batty et al., 2007). In this vein, Savanna-IQ Interaction Hypothesis conjectures that intelligence is positively associated with 'evolutionarily novel' behavior (Kanazawa, 2012). While there is evidence that excess food intake is the innate behavior, dieting, a deliberate restriction of food intake, is an evolutionarily novel phenomenon that is conjectured to be associated with higher intelligence. Even the traditional form of fasting, as observed in asceticism (Banks, 1996) and related religious phenomena, could only appear at a fairly advanced level of cultural (and presumably cognitive) evolution.[2]

Finally, a small number of empirical studies investigate the association between intelligence (cognitive abilities) and obesity using country-level survey data. For example, Kanazawa (2013), using NCDS – a large-scale prospectively longitudinal study, reports that intelligence has a negative impact on obesity in adulthood. In the same year, Belsky et al. (2013) provides further evidence that obesity is closely linked with low intelligence quotient (IQ) based on data from the Dunedin Multidisciplinary Health and Development Study. Similarly, negative correlations between IQ and obesity are reported for Dominica (Meisenberg et al., 2006), Sweden (Rosenblad et al., 2012) and South-East Asia (Poh et al., 2013).

Using data from 187 countries, we establish that there is an inverted U-shaped relationship between IQ and BMI. This effect remains intact after we control for suggested antecedents of obesity. This paper proceeds as follows. Section 2 presents data and an empirical model. Section 3 discusses the main results and Section 4 concludes the paper.

---

[2] We would like to thank one anonymous reviewer for making this important point.

2. Data and Empirical Model

Model

In order to get the quantitative impact of IQ on the 'weights of nations', we estimate the following regression model:

$$BMI_i = \beta_o + \beta_1 IQ_i + \beta_x CV_i + e_i \qquad (1)$$

where the dependent variable is a Body Mass Index, BMI; IQ is an average national intelligence; and CV is a vector of control variables.

Dependent variable

In this paper we analyze the impact of IQ, intelligence quotient, on gender-specific human weight levels across countries in the world. Our dependent variable is a BMI, measured by kg per square meter, which represents the weights of male and female populations in a cross-country scale for 2008. The WHO regards a BMI of less than 18.5 as underweight, from 18.5 to 25 as normal, while a BMI greater than 25 is considered overweight and above 30 is obese. The data is obtained from Funucane et al. (2011). Authors estimate Body Mass Indices for adults 20 years and older in 199 countries and territories, using published and unpublished health examination surveys and epidemiological studies.

Independent variables

Our variable of interest is average national IQ scores which can be treated as a proxy for national intelligence levels. Although definitions and measures of intelligence vary substantially, on the macroeconomic level nation-IQ is a robust measure for the level of cognitive development (Lynn &Vanhanen, 2012). The data is adopted from Lynn and Vanhanen (2006), which is an updated version of Lynn and Vanhanen (2002).

Figures 1 and 2 that plot the level of intelligence (using national IQs) against dependent variables strongly suggest non-linear impact of intelligence on BMI. The curve estimations in Figures 1 and 2 take the pattern of a reversed U-shape. Hence, in our regressions we test for the existence of a non-linear inverse U-shaped relationship between intelligence and BMI by incorporating IQ-squared as a regressor.

[Figure 1 is about here]

[Figure II is about here]

In this paper we consider several factors as possible control variables in our model. Following De Vogli et al. (2013), to capture the effects of globalization, we use KOF Index of Globalization for 2007, which measures the three dimensions of globalization: economic, social and political. Social component of the index is of particular importance in this case since it captures such issues as personal contact (e.g. telephone traffic, international tourism, etc.), information flows (e.g. number of internet users, and television per 1000 population, etc.), cultural proximity (e.g. number of McDonald's restaurants, and Ikea per capita, etc.), all of which can affect the BMIs of world countries. By saying this, by no means do we disregard the vitality of other two channels of globalization process incorporated in this index.

In line with many empirical research literatures, we include a number of socio-economic indicators into our model. First, like in Cremieux et al. (1999) we use health expenditure in percentage of GDP as a proxy variable to seize control of the quality of healthcare system on tackling obesity and related diseases in particular. Second, we include a variable on the percentage share of population aged 65 and above into our model since some papers indicate that there is a U-shaped association between age and BMI (e.g. Stevens, 1998). Third, as many survey-based micro-level research papers suggest (e.g. Brunello et al., 2015; Baum and Chou, 2011), health outcomes are related to per capita income of people, which is why we can extrapolate it to a cross-country level, like in De Vogli et al. (2013) or Gallet (2013), and incorporate GDP per capita measure in our regression[3]. Lastly, to take into account geographical specificities, we include continental dummies used in La Porta et al. (1999) into the regression model. The descriptive statistics are presented in Table 1.

[Insert Table 1 about here]

2. **Results**

The econometric results are reported in Tables 2 and 3. Table 2 presents the outcome for female BMI. The control variables are in line with related studies and are statistically significant in several cases. The GDP per capita is positive and statistically significant at the 1% level. GDP per person thus increases BMI. Globalization, measured by KOF index, is positive but statistically insignificantly associated with BMI. The *age65* variable and its squared term are statistically significant in a number of cases. The coefficients for continental dummies are significant throughout the regression, and show that population in Oceania (reference group) has higher BMI than in the rest of the world. Focusing on intelligence, we find evidence of inverted U-shaped pattern with a turning point at 80.8 points in model 3.

[Insert Table 2 about here]

Table 3 reports an analogous exercise for male BMI. The estimates are very similar to the results in the previous table. For example, if the GDP per capita in model 3 increases by 10%, BMI goes up by about 0.12 points, given that other variables are kept fixed. As anticipated, healthcare expenditure has a positive impact on BMI only when we do not control for continental dummies. Model 3 shows that the results for IQ and its squared term remain intact when we control for continental dummies and socio-economic determinants of BMI. In particular the turning point for male BMI is 83.7 points.

[Insert Table 3 about here]

[3] We take natural logarithm of GDP per capita as its distribution is badly skewed.

3. Robustness checks

We have checked robustness of our findings in two ways. First, Malik et al. (2013, p. 13) argues that "worldwide increase in the incidence of obesity and related chronic diseases has largely been driven by global trade liberalization, economic growth and rapid urbanization, which continue to fuel dramatic changes in living environments as well as in diets and lifestyles that promote positive energy balance". Therefore we re-estimate Eq. (1) with alternative vector of control variables: urbanization level, trade openness and real GDP growth. We average these variables over the 2000-2008 period. We also introduce cigarettes consumption per capita to capture the prevalence of tobacco consumption. In line with related studies (e.g. John et al., 2005; Chiolero et al., 2007) consumption of cigarettes increases weight and its coefficient is statistically significant at 1% or 10% level.

Second, we rely on robust regression – an alternative to OLS regression that controls for potential outliers that may bias the estimates. The results reported in Table 2 show that using a different set of control variables does not change the findings for key hypotheses; IQ retains its inverted U-shaped pattern for male and female BMI. Turning to control variables, urbanization, and trade openness are positively associated with BMI.

[Insert Table 4 about here]

Conclusion

Findings in this study should be elucidated with caution since the estimated models do not reproduce any particular nation. But the estimates from our cross-national regressions are advantageous to explore some polemical issues reviewed in health economics literature. The above results document the existence of inverted U-shaped link between intelligence and BMI. This relationship remains intact after controlling for GDP per capita, trade openness, urbanization and demographic structure.

The conclusion here is that at the early stages of cognitive development, especially in less developed nations, an increase in nation IQ improves healthcare provisions, quality of institutions and results in higher earnings which inevitably reduce undernourishment (Kanyama, 2014). On the other hand, technological changes, demographic shifts and urbanization further contribute to obesity of nations. Therefore it may be more persuasive to focus efforts on reducing obesity by investing in cognitive skills and promoting social capital, rather than limiting urbanization processes and economic growth. Thus, cognitive aspects of obesity problems remain to be possible avenues for future research.

References

Banks, C. G. (1996). “There is no fat in heaven”: religious asceticism and the meaning of anorexia nervosa. *Ethos,* 24(1), 107-135.

Baum, Ch. L. (2009). The effects of cigarette costs on BMI and obesity. *Health Economics,* 18.1: 3-19.

Baum, Ch. L. & Chou, Sh-Y. (2011). The Socio-Economic Causes of Obesity. *NBER Working Paper Series,* WP 17423.

Belsky, D. W., Caspi, A., Goldman-Mellor, S., Meier, M. H., Ramrakha, S., Poulton, R., & Moffitt, T. E. (2013). Is obesity associated with a decline in intelligence quotient during the first half of the life course? *American Journal of Epidemiology,* 178(9), 1461-1468.

Brunello G., Fort M., Schneeweis N. & Winter-Ebmer R. (2015). The Causal Effect of Education on Health: What is the Role of Health Behaviors? *Health Economics,* DOI: 10.1002/hec.3141.

Chiolero, A., Jacot Sadowski, I., Faeh, D., Paccaud, F. & Cornuz, J. (2007). Association of cigarettes smoked daily with obesity in a general adult population. *Obesity,* 15(5), 1311-1318.

Cohen A. K., Rai M., Rehkopf D. H. & Abrams B. (2013). Educational attainment and obesity: a systematic review. *Obesity Reviews,* 14.12: 989-1005.

Cremieux P., Ouellette P. & Pilon C. (1999). Health care spending as determinants of health outcomes. *Health Economics,* 8: 627-639.

Cutler D. M., Glaeser E. L. & Shapiro J. M. (2003). Why have Americans become more obese? *Journal of Economic Perspectives,* 17: 93–118.

De Vogli R., Kouvonen A., Elovainio M. & Marmot M. (2013). Economic globalization, inequality and body mass index: a cross-national analysis of 127 countries. *Critical Public Health,* DOI: 10.1080/09581596.2013.768331.

Dreher A., Gaston N. & Martens P. (2008). Measuring Globalization – Gauging Its Consequences. Springer, Berlin.

French M. T., Norton E. C., Fanq H. & Maclean J. C. (2010). Alcohol consumption and body weight. *Health economics,* 19.7: 814-832.

Finucane M. M., Stevens G. A. & Cowan M. J. (2011). Global Burden of Metabolic Risk Factors of Chronic Diseases Collaborating Group (Body Mass Index). National, regional, and global trends in body-mass index since 1980: systematic analysis of health examination surveys and epidemiological studies with 960 country-years and 9.1 million participants. *Lancet*.

Gallet C. A. (2003). Tobacco control and obesity: evidence from a cross section of countries. *Applied Economics Letters,* 20: 80-83.

Gomez, M. B. & Muntaner C. (2005). Urban redevelopment and neighborhood health in East Baltimore, Maryland: the role of communitarian and institutional social capital. *Critical Public Health*, *15*(2), 83-102.

Stevens, J., Cai, J., Pamuk, E. R., Williamson, D. F., Thun, M. J. & Wood, J. L. (1998). The effect of age on the association between body-mass index and mortality. *New England Journal of Medicine*, 338(1), 1-7.

Hooghe M., Sofie M. & Thomas dV. (2012). The cognitive basis of trust. The relation between education, cognitive ability, and generalized and political trust. *Intelligence,* 40.6: 604-613.

John, U., Hanke, M., Rumpf, H. J. & Thyrian, J. R. (2005). Smoking status, cigarettes per day, and their relationship to overweight and obesity among former and current smokers in a national adult general population sample. *International journal of obesity*, 29(10), 1289-1294.

Jones G. 2011. National IQ and national productivity: The hive mind across Asia. *Asian Development Review,* 28.1: 51-71.

Kanazawa, S. (2013). Childhood intelligence and adult obesity. *Obesity,* 21(3), 434-440.

Kanazawa S. (2014). General intelligence, disease heritability, and health: A preliminary test. *Personality and Individual Differences*, *71*, 83-85.

La Porta R., Lopez-di-Silanes F., Shleifer A. & Vishny R. (1999). The quality of government. *Journal of Law, Economics and Organization,* 15: 222–279.

Lynn R. & Vanhanen T. (2012a). National IQs: A review of their educational, cognitive, economic, political, demographic, sociological, epidemiological, geographic and climatic correlates. *Intelligence, 40*(2): 226-234.

Lynn R. & Vanhanen T. (2012b). Intelligence. A unifying construct for the social sciences. London: Ulster Institute for Social Research.

Malik V.S., Willett W.C. & Hu B.F. (2013). Global obesity: trends, risk factors and policy implications. *Nature Reviews Endocrinology,* 9.1: 13-27.

Meisenberg G. (2012). National IQ and economic outcomes. *Personality and Individual Differences,* 53(2), 103-107.

Meisenberg, G., Lawless, E., Lambert, E. & Newton, A. (2006). Determinants of mental ability on a Caribbean island, and the mystery of the Flynn effect. *Mankind Quarterly,* 46(3), 273.

Meisenberg G. & Lynn R. (2011). Intelligence: A measure of human capital in nations. *Journal of Social, Political and Economic Studies,* 36.4: 421-454.

Nicole A. & Johnston D. W. (2014). Too much of a good thing? Exploring the impact of wealth on weight. *Health economics* (forthcoming).

Philipson T. (2001). The world-wide growth in obesity: an economic research agenda. *Health economics,* 10.1: 1-7.

Philipson T. & Posner R. (2008). Is the Obesity Epidemic a Public Health Problem? *Journal of Economic Literature,* 46.4: 974-982.

Poh, B. K., Rojroonwasinkul, N., Le Nyugen, B. K., Budiman, B., Ng, L. O., Soonthorndhada, K., ... & Parikh, P. (2013). Relationship between anthropometric indicators and cognitive performance in Southeast Asian school-aged children. *British Journal of Nutrition,* 110(S3), S57-S64.

Rosenblad, A., Nilsson, G. & Leppert, J. (2012). Intelligence level in late adolescence is inversely associated with BMI change during 22 years of follow-up: results from the WICTORY study. *European journal of epidemiology,* 27(8), 647-655.

Salovey P., Bedell B. T., Detweiler J. B. & Mayer J. D. (2000). Current directions in emotional intelligence research. In M. Lewis & J. M. Haviland (Eds.), Handbook of emotions (2nd ed., pp. 504–520). New York: Guilford Press.

Sturgis P., Read S. & Allum N. (2010). Does intelligence foster generalized trust? An empirical test using the UK birth cohort studies. *Intelligence,* 38.1: 45-54.

Subramanian S. V., Kim D. & Kawachi I. (2002). Social trust and self-rated health in US communities: A multilevel analysis. *Journal of Urban Health,* 79(S1): 21–34.

Yoon J. & Brown T. T. (2011). Does the promotion of community social capital reduce obesity risk? *The Journal of Socio-Economics,* 40.3: 296-305.

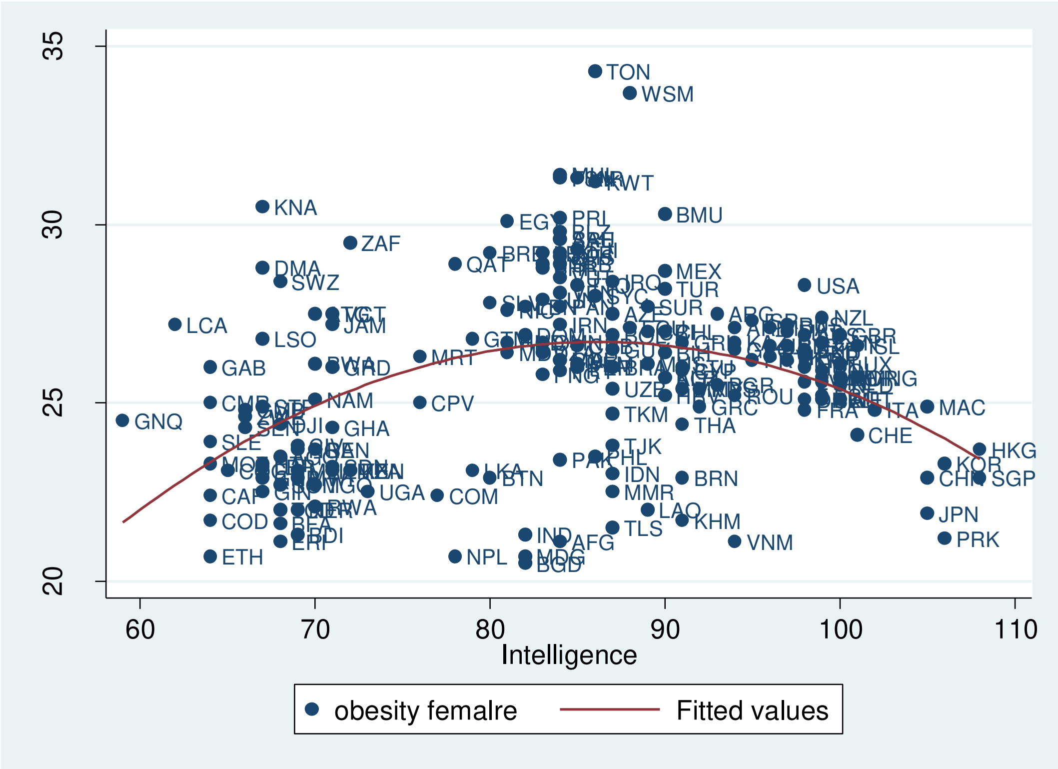

Figure 1
Scatter plot and curve estimation of female BMI against the level of intelligence

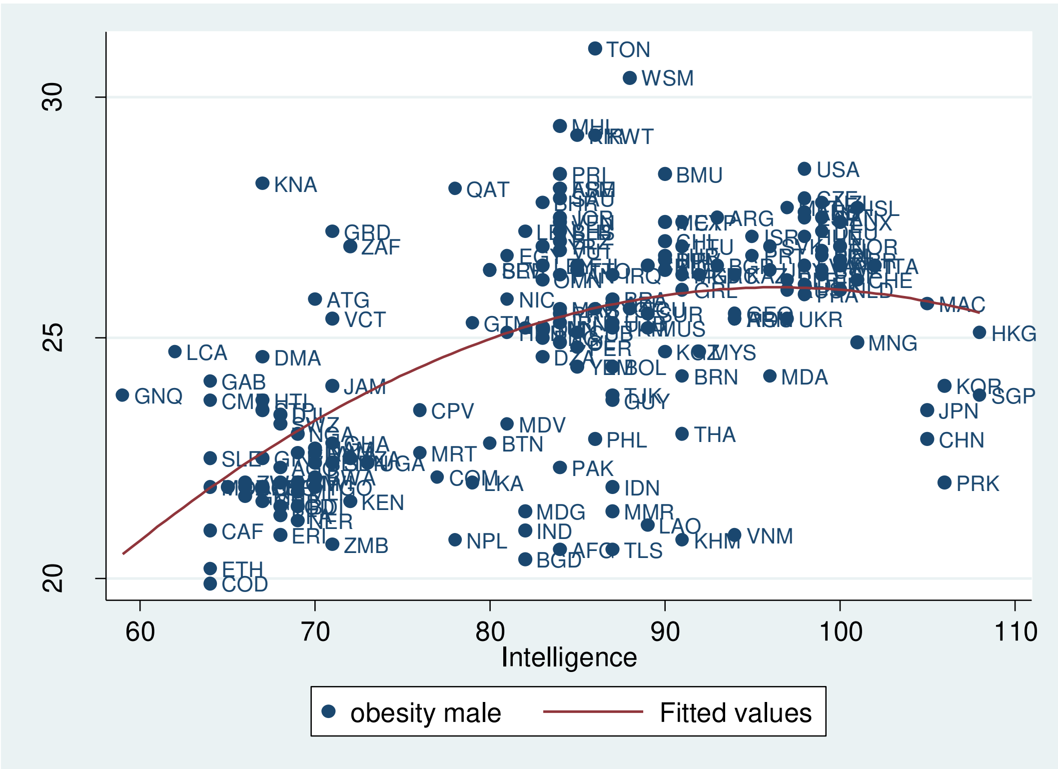

Figure 2
Scatter plot and curve estimation of male BMI against the level of intelligence

Table 1

Summary statistics for main variables

Variable	Description	Source	Mean	Std. Dev.
BMI_f	BMI for female, kg/square meter	Finucane et al. (2011)	25.8	2.672
BMI_m	BMI for male, kg/square meter	Finucane et al. (2011)	24.989	2.449
IQ	Nation IQ	Lynn & Vanhanen (2006)	84.152	11.823
GDP	GDP per capita logged	World Bank	2.145	1.275
Health	Health expenditure (% of GDP)	World Bank	6.495	2.710
KOF	KOF index of globalization	Dreher et al. (2008)	56.355	17.181
Age65	Share of population aged 65 and above	World Bank	7.196	4.814

Table 2

Intelligence and obesity: female

	(1)	(2)	(3)	(4)
IQ	1.1864***	0.8487***	0.9072***	0.9962***
	(0.2044)	(0.2069)	(0.1542)	(0.1525)
IQ^2	-0.0069***	-0.0049***	-0.0057***	-0.0063***
	(0.0012)	(0.0012)	(0.0009)	(0.0009)
Africa		-4.4768***	-3.6086***	
		(0.9963)	(1.0047)	
Asia		-4.6520***	-4.5003***	
		(0.8793)	(0.9973)	
Europe		-3.6054***	-3.4683***	
		(0.8049)	(1.1624)	

North America		-1.6505**	-3.0048***	
		(0.8301)	(1.0624)	
South America		-3.1744***	-3.4844***	
		(0.7943)	(1.0159)	
GDP per capita (log)			1.3843***	1.3201***
			(0.1950)	(0.1932)
Globalization			0.0036	0.0069
			(0.0147)	(0.0179)
Age65			0.2903	0.3795***
			(0.1496)	(0.1370)
Age65_squared			-0.0203***	-0.0238***
			(0.0062)	(0.0061)
Health			0.1095	0.1806**
			(0.0622)	(0.0854)
Constant	-24.3879***	-6.5034	-10.6965	-18.2377***
	(8.4973)	(9.2007)	(6.5532)	(6.0997)
N	187	187	170	170
adj. R^2	0.1636	0.3997	0.5939	0.4632

Notes: Heteroskedasticity adjusted robust standard errors in parentheses. Significance at the 1% level is denoted by ***; ** denotes significance at the 5% level; and * significance at the 10% level.

Table 3

Intelligence and obesity: male

	(1)	(2)	(3)	(4)
IQ	0.7620***	0.5169***	0.5921***	0.7370***
	(0.1847)	(0.1600)	(0.1000)	(0.1210)
IQ^2	-0.0039***	-0.0027***	-0.0036***	-0.0044***
	(0.0011)	(0.0009)	(0.0006)	(0.0007)

Africa		-3.8517***	-3.4603***	
		(0.6706)	(0.6755)	
Asia		-3.7031***	-3.7133***	
		(0.6381)	(0.6946)	
Europe		-1.7672***	-2.2899***	
		(0.5469)	(0.7422)	
North America		-1.2318**	-2.5272***	
		(0.5753)	(0.7140)	
South America		-2.4533***	-2.9624***	
		(0.6067)	(0.6952)	
GDP per capita (log)			1.2163***	1.1754***
			(0.1345)	(0.1408)
Globalization			0.0095	0.0128
			(0.0109)	(0.0145)
Age65			0.0871	0.1774
			(0.1040)	(0.1077)
Age65_squared			-0.0072	-0.0089
			(0.0042)	(0.0049)
Health			0.1102**	0.1703**
			(0.0527)	(0.0728)
Constant	-10.7071	3.5784	-0.1856	-10.1682**
	(7.5898)	(6.9493)	(4.1712)	(4.8315)
N	187	187	170	170
adj. R^2	0.3153	0.5367	0.7547	0.6458

Notes: Heteroskedasticity-adjusted robust standard errors in parentheses. Significance at the 1% level is denoted by ***; ** denotes significance at the 5% level; and * significance at the 10% level.

Table 4

Robustness checks

	(1) Female	(2) Male
IQ	1.2017***	0.7473***
	(0.1712)	(0.1363)
IQ^2	-0.0075***	-0.0043***
	(0.0010)	(0.0008)
Urbanization	0.0608***	0.0552***
	(0.0074)	(0.0059)
Smoking	0.0006**	0.0006***
	(0.0003)	(0.0002)
Trade openness	0.0103***	0.0045
	(0.0031)	(0.0024)
GDP growth	-0.0600	-0.0570
	(0.0471)	(0.0375)
Constant	-25.7044***	-10.5483
	(7.0231)	(5.5939)
N	171	171
adj. R^2	0.4449	0.6239

Notes: Heteroskedasticity-adjusted robust standard errors in parentheses. Significance at the 1% level is denoted by ***; ** denotes significance at the 5% level; and * significance at the 10% level.